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Abstract

EXPERIENCE OF OPERATION AND USE OF THE U.K. HIGH FLUX RESEARCH REACTORS

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The principal features of the three similar U.K. heavy water high flux research reactors, DIDO and PLUTO at Harwell and the Dounreay Materials Testing Reactor are briefly recalled. The total space available is listed for experiments in the three main categories of radiation damage, isotope production and beam use. The allocation of this space is quoted for each of several main types of experiment, for example non-fissile damage studies. The breakdown of effort in aid of specific power projects, general reactor technology, basic research and isotope production is also given.

Brief reference is made to the 5 MW light water pool reactor at Aldermaston and its merits for certain kinds of experiment are noted.

The present pattern of operation of the DIDO reactors is then described giving some details of costs, manpower, operating schedules, reactivity, fuel cycles, etc. The importance of well tried and highly reliable experimental equipment is emphasised. Examples of simple and general purpose equipment are quoted.

The scale of design, commissioning and supporting effort for such a programme is described with some reference to the organisational and safety arrangements that have been found most satisfactory.

Many of the physics measurements of flux and reactivity needed to design new reactor equipment and experiments and to plan changes in fuel and absorber loading are now carried out in a zero energy model of the reactors, known as DAPHNE, situated at Harwell. Some typical examples are illustrated.

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Brief mention is made of the Health Physics arrangement to detect and control leakage of radioactive species from either the reactor or experiments into the environment. Experience of tritium is particularly discussed.

The requirements for even higher flux thermal neutron beams have given rise to discussions about new systems devoted explicitly to neutron beam work. A brief review is made of the potential for further development of general purpose reactors of this class.